

EVALUATION OF BLACK-AND-WHITE MICROFILM SYSTEM

This report has been reviewed
and is approved.

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INTRODUCTION

The object of this task is to select microfilms and processes suitable for microcopying black-and-white films from the Earth Resources Aircraft Program. A further purpose is to chose duplication materials which are suitable for multiple generation copies for economical dissemination to satisfy index and reference purposes. The basic requirements are that the gamma of the negative film and the overall system gamma of the multi-stage duplication process should be near unity, and that there should be sufficient resolution to reproduce the major salient image features of the original 9 1/2-inch format film.

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DISCUSSION

The resolving power of the eye at reading distance is ~ 7 l/mm. At a reduction ratio of 17 (normal microfilm viewer magnification), this is equivalent to 119 l/mm desired on the final delivered microprint. Assuming that the camera uses an f/8.0 lens which should have a resolution between 125 and 225 l/mm, we can calculate the film resolution required for a 2-step film process with these lens resolutions. For best results, we arrive at 200-500 l/mm film resolution to achieve a final image resolution of 119 l/mm.

Twenty-seven films were considered as having potential qualities needed for the task. Nine were selected for preliminary testing. Of these nine, five were selected as possible candidates. Table I lists these films and some of their properties. Figure 1 presents relative time-gamma performance of some of the films considered.

From the five possible candidates, type 7464 film was considered to have the most potential for a negative material. Because of the high gamma (2.1) of this film, a different chemistry (D-76) was tested. This process reduced the gamma to a reasonable value (1.2 to 1.6). The effect of this change in processing on resolution was evaluated and preliminary measurement of the resolution of type 7464 film in this laboratory gave a value of 245 l/mm instead of 400 l/mm.

Further testing will be done of the resolution of the five possible films and of their image quality.

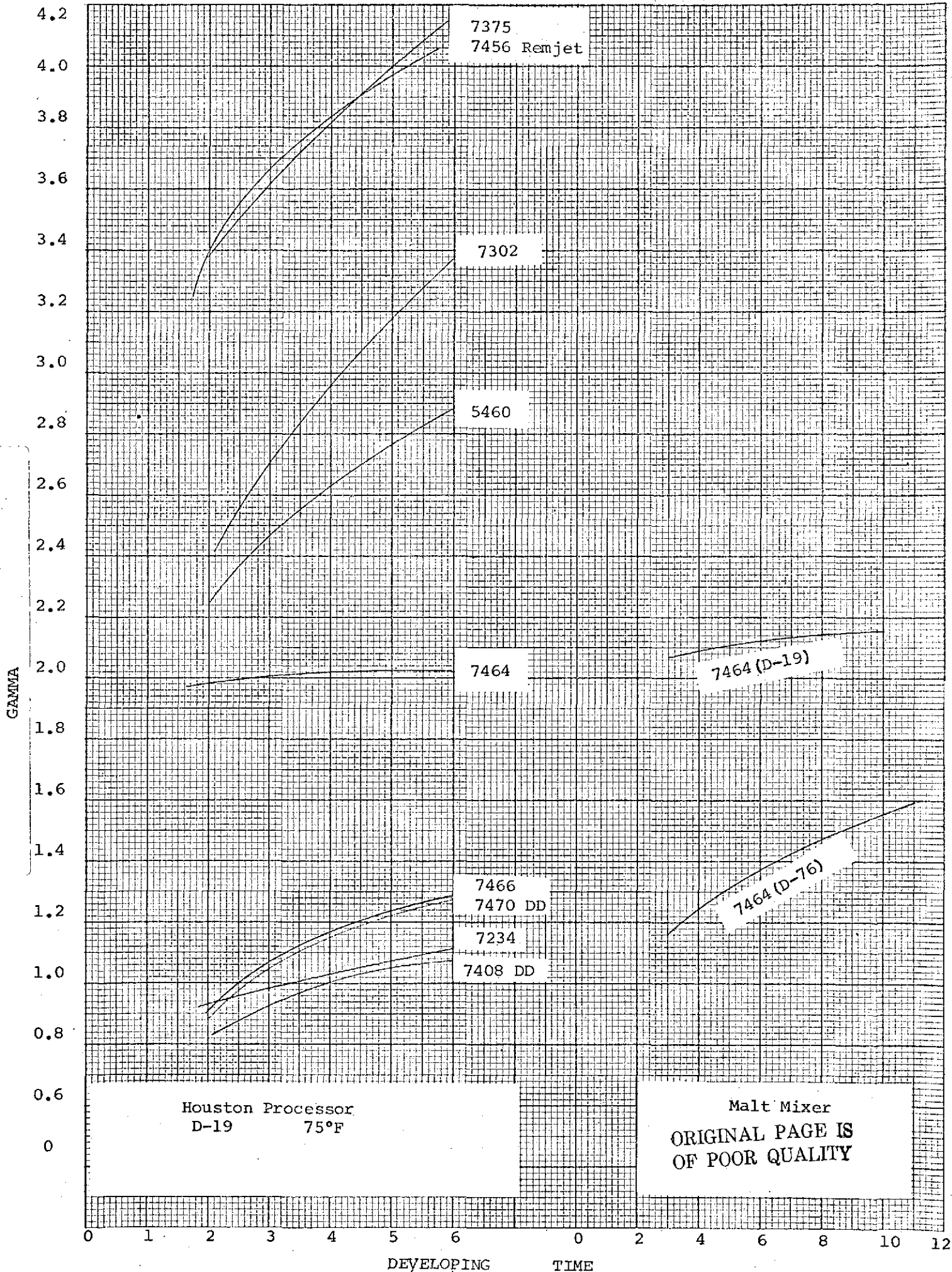


TABLE I
MICROFILM COMPARISON


Film Type	Resolution	D-19 Gamma	D-76 Gamma	Measured Speed (AFS)	Spectral Sensitivity	Remarks
7470	800	0.9-1.3		0.87	ortho	Direct Dupe
7468	800-1000	0.7-1.1		0.36	ortho	Direct Dupe
7466	280	0.9-1.3		0.31	Blue	
7234	200	0.9-1.1		1.28	Pan	Motion Picture Film
7464	400	1.9-2.04	1.2-1.6	0.55	Blue	
5460	630	2.4-2.9		4.10	Pan	Low Dmax
7302	125	2.4-3.4		0.81	Blue	Motion Picture Print
7456	400	3.2-4.1		16.70	Pan	Rem Jet Backing
7375	160	3.4-4.2		4.55	Blue	

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This task was initiated in order to select a B+W film suitable for the B+W portion of the microfilm operation.

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